Technical Resources for Engineering Efficiency (TREE) Team

2003 Annual Report

(July 2002 – June 2003)

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The TREE team completed 2 projects from July 2002 thru June 2003. In addition we started two other projects during this time period. These projects and other team activities during the last year are recapped below.

2002 Projects (July 02 – June 03)

Encompass

Encompass reclaims off-spec wafers and is located in Vancouver. Encompass receives off-spec silicon wafer from nearby wafer foundries. They strip and etch the off-spec wafers to remove the unwanted circuitry on the wafer. The processed wafers are then sent back to their original manufacturers. Work with Encompass began in July 2002. The team for this project was Marty Werner, Michelle Costenaro, Linda Pang, Mike Lynch, Lynn Coleman, and James DeMay.

The report outlined six opportunities where Encompass could save water and hazardous waste. The opportunities mainly focused on the strip and etch line. The opportunities included recycling their rinse water from their quick dump rinse tanks and changing bath chemistries to reduce hydrofluoric acid usage. Four of the opportunities were quantified and could save Encompass roughly 7 million gallons of water per year and 38,000 lbs of hazardous waste per year. They could also save around $83,000 with an average payback of less than a year. The total hours TREE members spent on the Encompass project were 352.

Del Monte

Del Monte is a vegetable canner located in Toppenish. Del Monte had WQ issues with their wastewater spray fields. They treat their wastewater and land apply it to a nearby spray field. The total dissolved solids (TDS) in their spray field had been rising over the past few years. The team for the Del Monte project was Emma Johnson, Kathy Cupps, Guy Hoyle-Dodson, Lynn Coleman and James DeMay.

The project focused on reductions of total dissolved solids in their waste water, solid waste and water usage. The report itemized 8 reduction opportunities. Del Monte could save nearly 13 million gallons of water per year and reduce their solid waste by 21 tons per year. The total hours TREE members spent on this project were 481.

Other Projects

The team also started working with Shell Solar and Chemco during this past fiscal year. TREE started working with Shell Solar in January 2003, but the project was not completed until July 2003. The project results will be described in next year's annual report. The team members for this project were Emma Johnson, Lynn Coleman, Michelle Costenaro, Guy Hoyle-Dodson, Linda Pang, and James DeMay. The team spent about 550 hours on the project during the 2002 year (July 02 – June 03).

The Chemco project started in January 2003. The team members for the project are Mike Lynch, Michelle Costenaro, Lynn Coleman, Marty Werner and James DeMay. Our work with Chemco was put on hold during the summer. Some stormwater sampling was necessary to complete the project, but was not possible in the summer due to lack of rainfall. The team spent around 208 hours working on the Chemco project during the 2002 year.

TREE Summary (1999 – 2003) Projected Totals

Project	Date	Total Investment ($)	Annual Savings ($)	Payback (years)	Water Reduction (gal/year)	Wastewater Reduction (gal/year)	Haz. Waste Reduction (lbs/year)	Solid Waste Reduction (tons/year)	Total Chemical Reduction (lbs/year)
Del Monte	Nov-02				12,926,000	12,926,000		21	
Encompass	Nov-02	$59,400	$83,300	0.7	6,696,000	6,696,000	38,700		
Independent Foods	Jun-02	$12,100	$22,800	0.5	2,968,000	2,968,000			79,600
Saint Gobain	Feb-02	$0	$108,000	0.0				95	
Skills, Inc.	Oct-01	$16,150	$52,900	0.3	1,604,000	1,604,000	32,300		3,300
Welch's	Jul-01	$110,600	$136,800	0.8	42,000,000				
Basin Frozen Foods (II)	Mar-01	$0	$93,400	0.0	46,000,000				
TC Systems	Jun-00	$41,500	$44,300	0.9	3,039,800	55,200	25,600		92,700
Rainier Ballistics	Dec-99	$74,600	$26,800	2.8	116,362	13,203	20,800		6,290
Prototron Circuits	Oct-99	$39,000	$90,600	0.4	742,300		11,000		15,436
Basin Frozen Foods (I)	Jun-99	$0	$10,770	0.0	31,590,000				
Industrial Plating	Sep-98	$50,000	$250,000	0.2	6,500,000	6,500,000	101,000	0	
Total:		**$403,350**	**$969,670**		**158,822,462**	**35,402,403**	**229,400**	**119**	**197,326**

Other Accomplishments

During the past year the TREE team has also worked on adding new members, marketing, and giving presentations. The team spent approximately 884 hours on these other projects.

During the past year we have recruited new members and expanded the team's staff and expertise. The team now has 12 members and the members come from six different programs. These programs include the Hazardous Waste & Toxics Reduction, Water Quality, Water Resources, Spills, Toxics Clean-up, and Solid Waste & Financial Assistance. We now have members from all four of the regions and in HQ. The two newest members are Madeline Wall from SWFA-NWRO and Scott Mallery WQ-ERO. The team also lost one of its members, Anise Ahmed who left from the WQ program to start a new position with the EAP program.

Table 2: TREE team members (as of October 2003)

TREE Staff	Program	Region	Start Date	FTE Level
Michelle Costenaro	HWTR	NWRO	May-02	0.25
James DeMay (lead)	HWTR	SWRO	Dec-98	0.55
Linda Pang	HWTR	SWRO	Dec-98	0.25
Marty Werner	HWTR	HQ	Sep-01	0.10
Mike Lynch	Spills	HQ	Sep-01	0.10
Emma Johnson	SWFA	NWRO	Mar-02	0.20
Madeline Wall	SWFA	NWRO	Apr-03	0.25
Norm Hepner	TCP	CRO	Apr-01	0.10
Kathy Cupps	WQ	HQ	Sep-01	0.05
Scott Mallery	WQ	ERO	Aug-03	0.10
Lynn Coleman	WR	HQ	Dec-01	0.40
Guy Hoyle-Dodson	WR	HQ	Apr-01	0.15
			Total:	2.50

Marketing the TREE program internally and externally has also been a major focus this year. The team did a major overhaul of it website (http://www.ecy.wa.gov/programs/hwtr/TREE/index.html). We also created a new color brochure and conference display. Some of the highlights included numerous presentations and articles to describe TREE and its services. We also participated with the Ecology booth at the Economic Development Summit (September 2002) & AWB Washington Environmental Conference (June 2002). The team was also aired on KGBI and KISS 106.1 radio stations.

In addition, the team revised it team charter. We expanded the sections on team member selection process and team decision making process. We also added an attachment of essential functions required for team members.

TREE Results Reported by Former Candidates

The following information was obtained by contacting facilities that TREE worked with prior to 2000. Facilities were asked which opportunities they choose to implement and what the results were.

Industrial Plating, Seattle (original TREE team candidate – September 1998)

IP moved tanks and quit storing solution in tanks as suggested. These opportunities created room for extra rinse tanks allowing IP to get cleaner rinsing with less water. They also began counterflow rinsing in their anodize and zinc lines. They still plan to implement other ideas but implementation is taking longer than Bob James (IP manager) would like. Bob believes that the best 'quick' measure of TREE's impact at IP can be seen in their water bill. Their annual water bill went from $80,000 in 1996 to $23,000 in 1999. Water use was 10 million gallons a year in 1996 vs. 3.5 million gallons a year in 1999. Hazardous sludge (F006) went from 160,000 pounds in 1996 to 59,000 pounds in 1999.

What is not as measurable is the good will and enthusiasm for Ecology engendered by TREE's work. At this year's generator workshop, Bob James gave a testimonial about TREE's services - stressing how much the team helped IP and that their services were free. He also raved about TREE at Metro's workshop for industrial dischargers in October 1999. Bob says "with our limited resources, we were able to achieve remarkable success with TREE" and "TREE got us on the road to continual improvement …the TREE concept pays long term dividends that are good for the environment and good for companies – it's a win / win approach". Bob believes that "working with the TREE team is a real education, you can see where the opportunities are and how simple techniques can reduce waste and save money". Because of their achievements – IP was one of two companies to receive King County Industrial Waste's Envirovation Award in 1998.

Basin Frozen Foods, Warden (June 1999)

The company implemented at least 2 of the team's 8 recommendations, including the opportunity the team saw as critical - move scrap potatoes without using water. Basin is using 85,000 gallons per day less water (saving over 22 million gallons a year) even though Basin has added a new french fry line. Their wastewater is also much cleaner now that scrap potatoes are not dissolving into their wastewater. Rich Tolman (Basin's plant manager) gives TREE "as high a recommendation as I can give" and said he was "glad they came down and gave us a hand". His reference was crucial to TREE gaining the confidence of Prototron Circuits. Rich believes continuing to implement the team's suggestions will reduce water use by an additional 90,000 gallons a day.

Prototron Circuits, Redmond (October 1999)

Prototron is working with two of TREE's suggestions. They have trained their operators to increase hang time in order to reduce drag-out. Kevin Richardson, Prototron plating manager, feels this will be a continual training opportunity for Prototron. They have also evaluated their rinsewater additions. As a result, they have cut back on fresh water additions to their automatic rinse cycles. Sometime in the future, Prototron plans to implement the ion exchange treatment system the team identified. Kevin Richardson "highly recommends" TREE to other companies. The team "didn't get in our way or anything" and "did their homework before they came". Kevin remembers the

TREE team as "helpful and pleasant to work with" and he has "no problem giving them a reference - have people call me".

Rainer Ballistics, Tacoma (December 1999)
Rainer has already implemented two of the team's ideas (slow withdraw and longer hang times). The implementation of these opportunities has extended the life of a couple of their baths as much as 60%. They are testing a third TREE suggestion of using slotted barrels. The slotted barrels will reduce their drag-out by over 50%. Rainer also wrote a letter thanking Ecology for the help they received from the TREE team. The letter contains glowing praise for TREE's team and the resulting report from Rainer's plant manager Eric Hampton. Eric writes "my comfort and confidence grew with each day.." and "..helped show us ways to save money while reducing hazardous waste at the same time.."

In 2003, Rainier implemented another TREE opportunity. They replaced their single pass cooing water system with a closed loop system. They have not had the chance to tabulated the water saved so far but believe that they will save around $8,000 per year.

TC Systems, Everett (June 2000)
TC Systems has completed one of TREE's suggestions and is currently working on implementing another. TREE found a water usage discrepancy of over 3 million gallons per year between their actual use and billing records from the city. During our evaluation TC Systems was being billed for 7.6 million gallons per year. Since our visit, TC Systems has fixed their water meter and replaced a water valve linking their two buildings. They are now using less than 2 million gallons of water per year. They are currently working on implementing TREE's suggestion of spray misting over the plating baths.

Basin Frozen Foods II, Warden (March 2001)
During our second visit the TREE team evaluated Basin's new French fry line. Since March, Basin has implemented two of TREE's suggestions. Before we arrived Basin was using approximately 704,000 gallons of water per day. They are now averaging around 534,000 gallons per day (May thru July 2001). This is a reduction of approximately 170,000 gallons of water saved each day. Don Wilson, Basin's plant manager, stated "this was a very successful project!"

Welch's, Grandview (July, 2001)
Of the four quantifiable opportunities identified by TREE, Welch's has optimized their apple washing station. Tom Brooke, plant engineer said water usage has been greatly reduced on the apple washing line. They also have received capitol spending approval for fiscal 04 to improve their waste treatment system (another TREE opportunity). Tom stated "TREE definitely pointed out areas by helping us quantify them. TREE was absolutely worth our time!! And they were very satisfied with TREE's work!"

Skills Inc., Ballard (October, 2001)
Skills has completely revamped their plating room. They removed all of their plating tanks and refinished the room. This included sand blasting the walls and ceiling, painting, installing a new

ventilation system, and resurfacing their sumps. They permanently removed their chromic acid plating line. Skills rearranged their tanks to simplify the process flow. They have also greatly reduced the number of hand dipping of plating buckets. They are in the process of implementing two more of the quantified opportunities listed by TREE. These are removing the manual hose in the plating room and installing their water filtration/recycling unit in the paint shop. Charlie Harris, Skills' Chief Executive Officer, stated "Using the TREE report, we redesigned and reconfigured our entire anodize building and operations with the specific goal of reducing resource utilization. The visibility of the TREE team during their visits and the resulting efficiencies of the finishing processes have motivated the operators of the facility to consider each action with an eye for resource conservation."

During the past year (2003) Chris Arfman, Skills' Environmental Manager, had this to say about their progress, "we have not completely won the battle of the hoses, our water consumption due to the rearranging of the tanks and decreasing drag-out has substantially decreased! I don't have my Ballard reports right in front of me this second, but I can tell you that in the year 2000, we were averaging over 100,000 gallons water a month (120,000 – 140,000). This year we are averaging a little less than 50,000 per month (last month we reported about 60,000 gallons.)"

"In Auburn, we have gone from an average of over 250,000 gallons a month to 90,000 – 150,000. This is due primarily to batch treating the waste instead of the previous tech's method of trying to flush the tanks with water. Abbas is employing the same method of batch treatment over dilution in Ballard as well. Spray Rinses have been a huge contributing factor in Auburn reducing drag-out too."

"In March, the Deer-Path system was reassembled in the Ballard paint shop, and has saved us tens of thousands of dollars in hazardous waste fees. We went from generating 15-18 drums of waste paint and water per month TO one half of a drum of DeerPath sludge, and 2 drums of spent wash water in 6 months! This is a HUGE success!"

Saint Gobain Crystals & Detectors, Washougal (February 2002)

Saint Gobain has researched 4 of the 6 opportunities identified by the TREE team. Only six months later and they have already implemented 3 of the opportunities researched. These where reducing their solid waste, back flush and evaluate their waste coolant membranes, and they have purchased a drum crusher for their metal wire. They have started to remove the water form their waste boron carbide slurry which has reduced their waste by 44% which should translate into around 42 tons per year. They have also instituted a formal facility wide recycling program. They recycle wood, plastic, florescent tubes, packaging material, paper, and metal.

Yvonne Cox, HR/HSE Manager, stated in their evaluation of the TREE team "It is an excellent way to learn new ideas and have the information and resources made known to a business on how to do things better. The team is another set of eyes to look at our processes. Sometimes those of us who work at a business cannot, "see the forest for the TREE's" (pun intended!) because we live at the job every day. It was excellent to have the feedback. It confirmed that we do an excellent job on almost everything but we do have room to be creative in a couple of other areas."

Independent Foods, Sunnyside (June 2002)
Independent Foods has implemented 4 of 5 quantifiable opportunities (everything except the valve control opportunity). The water softener opportunity was the biggest savings of water, salt and TDS. He hopes to be able to quantify some of the savings when he gets time. Mike found our services worthwhile and has since had other audits done by TA staff from different departments (L&I). He has also recommended our services to other companies. Mike Trader, Independent Foods plant manager stated, "We found TREE services very valuable. They helped pinpoint problems and find solutions at no cost to us. It was a good deal."

Encompass Materials, Washougal (November 2002)
Six months after working with TREE, Encompass had implemented 2 of 4 quantifiable opportunities recommended by TREE. They have reduced water usage by 220,000 gallons per year and eliminated all of their hazardous waste or roughly 30,000 lbs per year.

When asked bout recommending TREE to other companies Scott Landrigan, operations manager, stated "Absolutely !!..This talented group of engineers would be a valuable asset to any organization striving for continuous improvement. I would highly encourage any company to use this resource. We are very appreciative that the team was available through the Department of Ecology as a technical resource."

Del Monte, Toppenish (November 2002)
We are still waiting to hear back from Del Monte.

TREE Team

The following staff are on the team as of October 2003.

James DeMay – HWTR SWRO. James is an environmental engineer with expertise in pollution prevention and process engineering. He is the team lead and spends 55% of his time on TREE activities.

Linda Pang – HWTR SWRO. Linda is an environmental engineer with expertise in both financial and system analyses. She has been a TREE team member since 1999. She spends 25% of her time on TREE.

Norm Hepner – TCP CRO. Norm has fourteen years of environmental and industrial hygiene surveillance and compliance experience. In the past nine years with Ecology, he has worked in 5 agency programs [Nuclear Waste, Toxics Cleanup, Water Quality, Solid Waste, and Water Resources.] Norm joined the team in April 2001 and spends 10% of his time on TREE.

Guy Hoyle-Dodson – WR HQ. Guy is a mechanical engineer with expertise in water conservation and wastewater treatment plants. He joined the team in April 2001 and spends 15% of his time on TREE.

Lynn Coleman – WR HQ. Lynn is an environmental engineer with expertise in water conservation and site remediation technologies. She joined the team in January 2001 and spends 40% of her time on TREE.

Kathy Cupps - WQ HQ. Kathy is an environmental engineer with expertise in water quality, wastewater treatment and water reuse. She joined the team in November 2001 and works in an ad hoc basis.

Marty Werner – HWTR HQ. Marty is an environmental engineer with expertise in hazardous waste management, RCRA permits, and site remediation. He joined the team in November 2001 and spends 10% of his time on TREE.

Mike Lynch – Spills HQ. Mike has five years experience in investigating spills (and near-spills) and analyzing systems (physical and management) for the purpose of developing pollution prevention recommendations. He joined the team in November 2001 and spends 10% of his time on TREE.

Emma Johnson – SWFA NWRO. Emma has experience in composting, waste reduction, recycling, toxics reduction, technical assistance, and grant administration. She joined the team in March of 2002 and spends 20% of her time on TREE.

Michelle Costenaro – HWTR NWRO. Michelle is a chemical engineer with expertise in pollution prevention and process engineering. She joined the team in June of 2002 and spends 25% of her time on TREE.

Madeline Wall – SWFA NWRO. Madeline is a civil engineer with expertise in solid waste management and site investigation and remediation. She joined the team in April 2003 and spends 25% of her time on TREE.

Scott Mallery – WQ ERO. Scott is a chemical engineer with expertise in performing comprehensive state permits compliance and efficiency analyses of industrial and municipal waste water treatment plants. Scott joined the team in August 2003 and spends 10% of his on TREE.